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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/598,867	05/29/2007	Wayne R. Dannels	PHUS040152US2	1626

38107 7590 09/17/2008

PHILIPS INTELLECTUAL PROPERTY & STANDARDS
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CLEVELAND, OH 44143

EXAMINER	
VARGAS, DIXOMARA	
ART UNIT	PAPER NUMBER
2831	

MAIL DATE	DELIVERY MODE
09/17/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/598,867	DANNELS ET AL.	
	Examiner	Art Unit	
	DIXOMARA VARGAS	2831	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15 and 17-20* is/are rejected.

7)☒ Claim(s) *16* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *09/14/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The listing of references in the Search Report is not considered to be an information disclosure statement (IDS) complying with 37 CFR 1.98. 37 CFR 1.98(a)(2) requires a legible copy of: (1) each foreign patent; (2) each publication or that portion which caused it to be listed; (3) for each cited pending U.S. application, the application specification including claims, and any drawing of the application, or that portion of the application which caused it to be listed including any claims directed to that portion, unless the cited pending U.S. application is stored in the Image File Wrapper (IFW) system; and (4) all other information, or that portion which caused it to be listed. In addition, each IDS must include a list of all patents, publications, applications, or other information submitted for consideration by the Office (see 37 CFR 1.98(a)(1) and (b)), and MPEP § 609.04(a), subsection I. states, "the list ... must be submitted on a separate paper." Therefore, the references cited in the Search Report have not been considered. Applicant is advised that the date of submission of any item of information or any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the IDS, including all "statement" requirements of 37 CFR 1.97(e). See MPEP § 609.05(a).

Specification

2. The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

(a) TITLE OF THE INVENTION.

(b) CROSS-REFERENCE TO RELATED APPLICATIONS.

(c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.

(d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.

(e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.

(f) BACKGROUND OF THE INVENTION.

(1) Field of the Invention.

(2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.

(g) BRIEF SUMMARY OF THE INVENTION.

(h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).

(i) DETAILED DESCRIPTION OF THE INVENTION.

(j) CLAIM OR CLAIMS (commencing on a separate sheet).

(k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).

(l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 1-14 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The claimed invention is directed to a judicial exception to 35 U.S.C. 101 (i.e., an abstract idea) and is not directed to a practical application of such judicial exception (e.g., because the claim does not require any physical transformation and the invention as claimed does not produce a useful, concrete, and tangible result). The language in the claim suggests only a combination of instructions without reciting a structure associated to the procedure and lacks a tangible result at the end of the procedure.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-3, 15, 17 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Hinks et al. (US 6,507,190 B1).

With respect to claim 1, Hinks discloses a magnetic resonance imaging method (column 2, lines 40 – 46) comprising: determining a magnitude shift of main B_0 magnetic field responsive to energizing one or more shim coils at selected currents (column 5, lines 46 – 62); energizing the one or more shim coils at the selected shim currents (Abstract); and performing a correction during the energizing to correct for the determined magnitude shift of the main B_0 magnetic filed (column 8, lines 13 – 36).

7. With respect to claims 2 and 20, Hinks discloses wherein the performing of a correction comprises adjusting a center frequency of radio frequency receiver and transmitter components to correspond to a magnetic resonance frequency at the B_0 magnetic field including the determined magnitude shift (column 7, liens 33 – 53).

8. With respect to claim 3, Hinks discloses wherein the performing of a correction comprises energizing a D.C. shim coil at a D.C. shim current effective for canceling the determined magnitude shift of the main B_0 magnetic field (Abstract).

9. With respect to claim 15, Hinks discloses a magnetic resonance imaging apparatus (as seen on Figures 1, 2, & 7) comprising: a means for generating a main B_0 magnetic field (magnetic assembly #14); one or more shim coils for shimming the main B_0 magnetic field (Figure 7, shim coils #406); a means for determining a magnitude shift of the main B_0 magnetic field responsive to energize the one or more shim coils at selected shim currents (#404); a means for energizing the one or more shim coils at the selected shim (#136); and a means for

performing a correction during the energizing to correct for determined magnitude shift of the main B_0 magnetic field (system control #122).

10. With respect to claim 17, Hinks discloses a magnetic resonance imaging scanner (as seen on figures 1, 2 & 7) comprising: a main magnet generating a main B_0 magnetic field (magnet assembly #141); one or more shim coils selectively shimming the main B_0 magnetic field at selected shim currents (Figure 7, shim coils #406); and a processor executing a process including determining a magnitude shift of the main B_0 magnetic field responsive to the selective shimming (system control #122).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claims 4, 13 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hinks et al. (US 6,507,190 B1) in view of Zhao et al. (US 2005/0154291 A1).

With respect to claims 4 and 19, Hinks discloses the claimed invention as stated above except for energizing one or more gradient coils to correct for one or more first order spherical harmonic terms of the determined magnitude shift of the main B_0 magnetic field. However, Zhao discloses energizing one or more gradient coils to correct for one or more first order spherical harmonic terms of the determined magnitude shift of the main B_0 magnetic field (Paragraph 0031) for the purpose of further improving the field homogeneity. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have energize one or more gradient coils to correct for one or more first order spherical harmonic terms of the determined magnitude shift of the main B_0 magnetic field as taught by Zhao with the method of Hinks for the purpose of further improving the field homogeneity as disclosed by Zhao (Paragraph 0031).

14. With respect to claim 13, Hinks discloses the claimed invention as stated above except for performing multi-slice magnetic resonance imaging of an imaging subject; and for each slice, selecting shim currents of the one or more shim coils to dynamically shim the main B_0 magnetic field for that slice, the determining of a magnitude shift, energizing and performing of a correction being performed for imaging of that slice. However, Zhao discloses performing multi-slice magnetic resonance imaging of an imaging subject; and for each slice, selecting shim currents of the one or more shim coils to dynamically shim the main B_0 magnetic field for that slice, the determining of a magnitude shift, energizing and performing of a correction being performed for imaging of that slice (Abstract, Paragraph 0045). Therefore, it would have been

obvious to one of ordinary skill in the art at the time the invention was made to have performing multi-slice magnetic resonance imaging of an imaging subject; and for each slice, selecting shim currents of the one or more shim coils to dynamically shim the main B_0 magnetic field for that slice, the determining of a magnitude shift, energizing and performing of a correction being performed for imaging of that slice as taught by Zhao with the method of Hinks for the purpose of improving the field homogeneity since the target shimming region is smaller for a slice than the whole volume as disclosed by Zhao (Paragraph 0045).

15. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hinks et al. (US 6,507,190 B1) in view of Kruger et al. (US 2005/0033156 A1).

With respect to claim 5, Hinks discloses the claimed invention as stated above except for computing one or more Maxwell terms of the magnetic field produced by energizing the one or more shim coils at selected shim currents; and determining the magnitude shift of the main B_0 magnetic field based on the computed one or more Maxwell terms. However, Kruger discloses computing one or more Maxwell terms of the magnetic field produced by energizing the one or more shim coils at selected shim currents; and determining the magnitude shift of the main B_0 magnetic field based on the computed one or more Maxwell terms (Paragraphs 0065 and 0070). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have computing one or more Maxwell terms of the magnetic field produced by energizing the one or more shim coils at selected shim currents; and determining the magnitude shift of the main B_0 magnetic field based on the computed one or more Maxwell terms as taught

by Kruger with the system of Hinks for the purpose of further improving the field homogeneities caused by the gradient field as disclosed by Kruger (Paragraphs 0065 and 0070).

Allowable Subject Matter

16. Claims 6-11, 14 and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

17. Claims 6-11 and 14 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 101 rejections, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

18. The following is a statement of reasons for the indication of allowable subject matter:

a. With respect to claim 6, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest an MRI method comprising the steps wherein for each of the one or more shim coils, determining one or more Maxwell term coefficients of the magnetic field produced by energizing that shim coil at the corresponding selected shim current; for each of the one or more shim coils, determining a magnitude shift contribution of that coil by (i) obtaining one or more Maxwell terms corresponding to the one or more Maxwell term coefficients of that coil by multiplying each Maxwell term coefficient of that coil by the current raised to a corresponding even power and (ii) summing the Maxwell terms in combination with the remaining limitations of claim 1 above.

b. With respect to claims 7-8, the claims have been found allowable due to its dependency on claim 6 above.

c. With respect to claim 9, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest an MRI method comprising the steps wherein the one or more shim coils includes a plurality of shim coils, and the determining a magnitude shift comprises: for each coil, determining a functional relationship between shim current and a shift contribution of that coil; inputting the selected shim current into the functional relationship to determine a shift contribution corresponding to the selected shim current; and combining the shift contributions corresponding to the selected shim currents of the plurality of coils to determine the magnitude shift in combination with the remaining limitations of claim 1 above.

d. With respect to claims 10, the claim has been found allowable due to its dependency on claim 9 above.

e. With respect to claim 11, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest an MRI method comprising the steps of selecting the selected shim currents by optimizing a figure of merit including the shim currents of the shim coils and a shim current of a D.C. shim coil wherein the performing of the connection includes energizing the D.C. shim coil at an optimized shim current obtained by the optimizing of the figure of merit in combination with the remaining limitations of claim 1 above.

f. With respect to claim 14, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest an MRI method comprising the steps of dividing a region to be imaged into a plurality of imaging regions; for each imaging region, determining selected shim currents effective for shimming the main B_0 magnetic field in that imaging region, the determining of the magnitude shift responsive to energizing one or more shim coils at selected shim currents being separately performed for each imaging region for, the selected shim currents effective for shimming the main Be magnetic field in that imaging region; and acquiring imaging data for each imaging region, wherein: (i) the energizing is performed as part of the imaging and uses the selected shim currents effective for shimming the main B0 magnetic field in that imaging region being imaged, and (ii) the performing of a correction is performed with respect to the magnitude shift determined for that region being imaged in combination with the remaining limitations of claim 1 above.

g. With respect to claim 16, the claim has been found allowable over the prior art of record because the prior art of record fails to teach or fairly suggest an MRI apparatus wherein the means for determining the magnitude shift includes a processor which performs a process including: determining one or more Maxwell terms coefficients for each shim coil; computing a magnitude shift of the main B_0 magnetic field produced by each coil based on a shim coil function having functional parameters including the one or more Maxwell term coefficients for that coil and the selected shim current for that coil; and combining the magnitude shift of the main B0 magnetic field produced by each coil in combination with the remaining limitations of claim 15 above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DIXOMARA VARGAS whose telephone number is (571)272-2252. The examiner can normally be reached on Monday to Thursday from 8:00 am. to 4:30 pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on (571) 272-2245. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Dixomara Vargas/
Primary Examiner,
Art Unit 2831